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United States Patent [19]**Deangelis et al.**[11] **Patent Number:** **5,734,797**[45] **Date of Patent:** **Mar. 31, 1998**

[54] **SYSTEM AND METHOD FOR DETERMINING CLASS DISCRIMINATION FEATURES**

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[52] U.S. Cl. **395/23; 395/21; 395/24**

[58] Field of Search **395/20-25, 27; 382/155-161**

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,444,824	8/1995	Austvold et al.	395/76
5,546,503	8/1996	Abe et al.	395/23
5,636,326	6/1997	Stork et al.	395/21

OTHER PUBLICATIONS

Jain et al. "Learning Texture Discrimination Masks," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 18, Issue 2, pp. 195-205, Feb. 29, 1996.

Lursinap "Applied Self-Recovery Technique to Link and Neuron Prunings," *Circuits and Systems, 1994 Midwest Symposium*, V. 1, pp. 545-548, Dec. 31, 1994.

Luk et al. "Pruning via Number of Links and Neuron Activities," *Circuits and Systems, 1993 IEEE International Symposium*, pp. 2415-2418, May 31, 1993.

Khorasani et al. "Structure Adaptation in FeedFoward Neural Networks," *Neural Networks, 1994 International Conf.*, vol. 3, pp. 1403-1408, Dec. 31, 1994.

Giles et al. "Pruning Recurrent Neural Networks for Improved Generalization Performance," *IEEE Transaction on Neural Networks*, vol. 5, Issue 5, pp. 848-851, Sep. 30, 1994.

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[57] **ABSTRACT**

A system for generating a minimal artificial neural network (ANN) architecture having as inputs the minimal number of features necessary to discriminate between event classes. A network generator generates an initial ANN architecture. A training processor generates a trained ANN by training the initial ANN to a desired degree of accuracy. A pruning processor prunes the trained ANN by removing interconnections and nodes from the trained ANN. The training processor and pruning processor continue to train and prune the ANN until a minimal network architecture having the class discrimination features as its only inputs is obtained.

6 Claims, 1 Drawing Sheet

